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A group of representatives from five schools met for two weeks to discuss means of improving arithmetic teaching. The content of each grade was examined. The purpose was to determine various approaches to motivate better learning. Notes of these meetings have been reproduced and suggestions for teachers offered.

Teachers should provide many opportunities every day for children to learn such terms as "more," "few," "many," "little," and "bit," even before they can count. Counting may be introduced by the rote saying of number names in order or sequence. A unit on the number system should be followed with one on whole numbers, with emphasis on addition and subtraction. Suggestions are made as to the sequential development of ideas in this unit.

To familiarize students with the use of numbers, helpful activities include work with U.S. money, fractional parts, measurements, graphs and charts, and geometric figures. Specific teaching techniques are suggested for each unit and sub-unit.

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GREAT CITIES SCHOOL IMPROVEMENT PROGRAM

SCHOOL DISTRICT OF PHILADELPHIA

FIRST YEAR

Claire N. Garber
Arithmetic Consultant

GREAT CITIES SCHOOL IMPROVEMENT PROGRAM
SCHOOL DISTRICT OF PHILADELPHIA

ARITHMETIC

July 1963

One group, which consisted of representatives from five schools, met for two weeks to discuss means of improving the arithmetic teaching. To do so we examined the content of each grade. We determined various approaches to motivate better learning. We examined materials useful in developing new concepts as well as materials for drilling.

It was decided to reproduce our notes as briefly as possible and to present these to the teachers in our respective faculties.

John Olivera, Ferguson School
Ida Ominsky, Ludlow School
Margaret Robinson, Dunbar School
Audrey Sack, McKinley School
Barbara Simmons, Harrison School
Claire N. Garber, Arithmetic Consultant

FIRST YEAR

The Study of Number

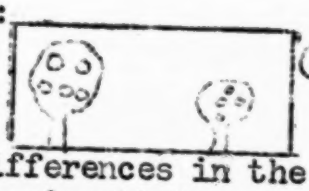
I. The Number System

A. Comparing

1. Expanding Arithmetical Vocabulary. Form R 601 may be used to check how much understanding children have with vocabulary.

The teacher should provide many opportunities every day for children to learn such terms as more, few, many, little, bit, etc., even before they can count.

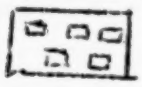
CHARTS:

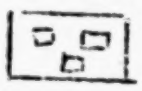


Compare: large, small, many, few, etc.

2. Recognizing differences in the size groups. Children are guided to recognize that a group of eight is larger than a group of three.

COMPARE SPOTS ON SPOT CARDS.





B. Counting

1. Rote saying number names in order or sequence without thought of meaning.

a. Give the child a visual picture of the numbers as he counts.

b. The teacher may use number rhymes to help establish the number names in their proper order.

c. Construct a chart which begins with zero.

0	10	20	30	40	50	60	etc.
1							
2							
9	19	29	39	49	59	69	

(1) Have counting beginning with numbers other than one.

Example - 2 to 9, 5 to 46.

(2) Count backward as well as forward; thereby developing the idea of getting less as in subtraction and division.

2. Enumerating or rational counting - associating the number names with the corresponding number of objects.

USE CARDS WITH SYMBOLS AND SPOTS.

Provide numerous occasions for the children to count various objects present in the room - books, children present, milk bottles, chairs, etc.

3. The serial idea of number - This type of counting involves an understanding of the order of our number system.

a. Cardinal is meaning with rote counting.

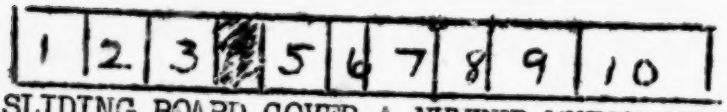
b. Ordinal is order of numbers.

(1) The teacher may ask a child to arrange a group of numbered cards in order.

(2) Have numbered cards scattered around the room. Let the children gather the cards and place them in order.

(3) A drill may be developed in the following way:

(a) Write the number after 5
(b) Write the number before -
(c) Write the number between -



HAVE SLIDING BOARD COVER A NUMBER WHICH CHILDREN CAN IDENTIFY

(4) The teacher can develop many other devices to determine the child's ideas about the serial order of number.

(5) Correlate the writing of numbers with the handwriting lesson. Constantly check to see if the number is being written correctly.

C. Reading and writing numbers.

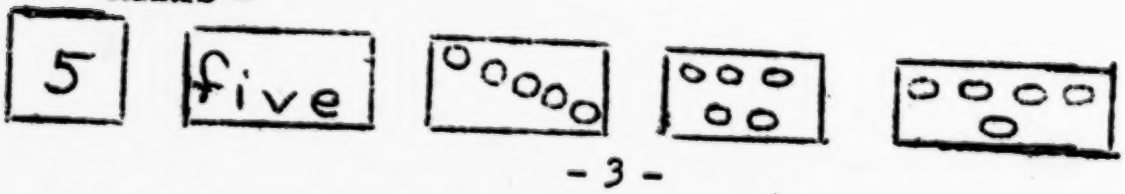
1. Children should read and write numbers to 100. Some activities for reading and writing numbers are:

a. Finding the pages in a book.
b. Reading room numbers.
c. Reading numbers on clocks.

2. Develop the understanding of what numbers tell us.

D. Studying groups - number concepts to 9

CHARTS -



All concepts should be introduced, developed, and applied concretely through the use of social experiences.

The aim is to be able to associate the number symbol with the number name and to recognize the group without counting as well as to reproduce the number groups.

II. Whole Numbers

Subtraction is taking a group apart.
Addition is putting groups together.

A. Suggested sequential development. The various arrangements for a group are studied together. The facts that are discovered are considered as separate items, but the whole story is kept in mind.

Group of 2

$$\begin{array}{cc} 2 & 1 \\ \underline{1} & \underline{1} \end{array}$$

Group of 3

$$\begin{array}{cccc} 3 & 2 & 3 & 1 \\ \underline{1} & \underline{1} & \underline{2} & \underline{2} \end{array}$$

Careful study should continue to and include groups of 9.

B. Six steps in teaching procedure:

1. Use concrete material.
2. Record number experiences orally, pictorially, and symbolically.
3. Interpret pictorial or symbolic representation.
4. Move from concrete to abstract.
5. Record with abstract symbols.
6. Extend and apply number experiences socially.

C. Organizing the group - During the study of a group, children are helped to organize the related facts.

$$\begin{array}{cccc} 6 & 5 & 6 & 1 \\ \underline{1} & \underline{1} & \underline{5} & \underline{5} \end{array}$$

D. Column addition - The teacher may make use of the other arrangements of a number to teach the beginnings of column addition.

E. Organize other groups of related facts:

CHARTS

4	5	9

CHILDREN GIVE THE FOUR FACTS

$$\begin{array}{cccc} 4 & 5 & 9 & 9 \\ \underline{5} & \underline{4} & \underline{4} & \underline{5} \\ 9 & 9 & 5 & 4 \end{array}$$

Sufficient drill or practice in thinking should be provided throughout the entire development.

The mastery of one group by every child is not a prerequisite for studying other groups.

The Use of Number

I. U.S. Money - Concrete development through meaningful and real situations.

A. Cent and penny may be used interchangeably.

B. Have a chart showing the money equivalents.

C. Forms R 602 - R 602B may be used in the development of U. S. Money.

II. Fractional Parts - Concrete development; no computation.

A. Develop $\frac{1}{2}$ and $\frac{1}{4}$

B. Develop two ideas in fractions:

part of the whole and part of a group

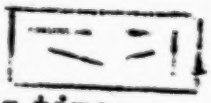
C. Illustrate the sum of the parts equal a whole:

$$\frac{4}{4} = 1 \qquad \frac{2}{2} = 1$$

D. Show relationships $\frac{2}{4} = \frac{1}{2}$

The social application of fractions can be found in telling time, handling money, and using such measurements as the dozen and the pound.

III. Measurements - A beginning in the idea of measurement is developed through crude comparisons of size, quantity, time, weight, space, and form.

CHART  LINES OF MANY SIZES ARE COMPARED

A. Telling time
Order of events

1. Today, tomorrow, yesterday
2. Calendar - months, days of the week
   Keep a calendar recording weather, birthdays, etc.
3. Clock - to the hour, to the $\frac{1}{2}$ hour.

B. Linear measure

Children should be made aware of the foot, inch, and the yard.

C. Quantity

1. Quart, pint, $\frac{1}{2}$ pint, measuring cup
2. Dozen, $\frac{1}{2}$ dozen
3. Pair
4. Pound

In addition to the preceding list, the children might learn other quantities that the teacher deems feasible.

D. Temperature - It is important that children have an understanding of the use of the thermometer -

EACH CHILD SHOULD HAVE A REPRESENTATIVE THERMOMETER TO READ.

IV. Graphs and Charts

A. Graphs and charts provide a means of seeing number relationships in a very practical way.

B. Graphs and charts may be used to illustrate group and individual activities such as temperature readings, weights and heights of children and contributions to various causes.

V. Geometric Figures

A. A young child can see and recognize differences in the shapes and sizes of geometric figures.

B. Develop recognition of the circle, square, and triangle.

THESE SHAPES MAY BE USED IN ART LESSONS.

Problem Solving

As children learn new skills, they should have opportunity to apply them in problem situations.

In Year One, children solve oral problems relating to their experiences and to the grade work.

Barbara Simmons
Harrison School

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